DIVISION 700
MATERIALS DETAILS

SECTION 701
HYDRAULIC CEMENT

The Contractor shall provide suitable means for storing and protecting the cement against dampness. Cement which for any reason has become partially set or which contains lumps of caked cement will be rejected. Cement salvaged from discarded or used bags shall not be used.

701.1-PORTLAND CEMENT:
Portland cement shall conform to the requirements of ASTM C 150, Type I.

701.2-BLANK:

701.3-BLENDED HYDRAULIC CEMENTS:
Blended hydraulic cement shall conform to the requirements of ASTM C 595 for Portland Blast-Furnace Slag Cement, Type IS, or Portland-Pozzolan Cement, Type IP.

701.4-MASONRY CEMENT:
Masonry Cement shall conform to the requirements of ASTM C 91.

SECTION 702
FINE AGGREGATE

702.1-FINE AGGREGATE FOR PORTLAND CEMENT CONCRETE:

702.1.1-General Requirements: Fine aggregate shall consist of natural sand, manufactured sand, or a combination thereof, conforming to the requirements of these Specifications.

702.1.2-Deleterious Substances: The Maximum percentages of deleterious substances shall not exceed the limits below.

MATERIAL	PERCENT BY WEIGHT
Amount finer than No. 200 (75 µm) sieve for manufactured fine aggregate (determined by AASHTO T 11 and T 27). A manufactured fine aggregate is one which has been reduced in particle size by crushing	5
Amount finer than No. 200 (75 µm) sieve for all other sands (determined by AASHTO T 11 and T 27)	3
Coal and other lightweight deleterious material (determined by MP 702.01.20)	2
Friable particles (determined by MP 703.01.20)	1

Larger percentages passing the No. 200 (75 µm) sieve in the fine aggregate fraction will be permitted if the percent passing the No. 200 (75 µm) sieve in the coarse aggregate fraction (703.4) is less than the specified maximum. In no event, however, shall the percent passing the No. 200 (75 µm) sieve in the total concrete aggregate be greater than an amount which would exist if both aggregate fractions contained their specified maximum percentage passing the No. 200 (75 µm) sieve.

702.1.3-Soundness (Determined by MP 703.00.22): When the fine aggregate is subjected to five alternations of the sodium sulphate soundness test, the weighted loss shall not exceed 10 percent by weight.

702.1.4-Organic Impurities (Determined by AASHTO T21): When the fine aggregate is subjected to the organic impurities test, the color shall not be darker than the standard. In the event a color darker than the standard is produced, the acceptability of the material will be determined as specified in 702.1.5.

702.1.5-Mortar Strength (Determined by AASHTO T71): Fine aggregate failing the organic impurities test shall be subjected to the test for mortar making properties. The fine aggregate shall develop a compressive strength at the age of seven days when using Type I or II cement, or at three days when using Type III cement, of not less than 90 percent of the strength developed by a mortar prepared in the same manner with the same cement and graded Ottawa sand having a fineness modulus of 2.4 plus or minus 0.10.

702.1.6-Grading: The fine aggregate used for developing a concrete mix design shall have an Ā of 6.1 plus or minus 0.4.

The Ā value shall be determined by adding the cumulative percentages by

weight of material passing each of U.S. Standard Sieve Nos. 1½ in. (37.5 mm), ¾ in. (19 mm), ⅜ in. (9.5 mm), 4 (, 4.75 mm), 8 (2.36 mm), 16 (1.18 mm), 30 (600 µm), 50 (300 µm), 100 (150 µm), and 200 (75 µm) and dividing by 100.

The graduation shall be determined in accordance with AASHTO T 27 and T 11.

702.1.7-Uniformity of Grading: The gradation limits given in 702.1.6 represent the extreme limits which shall determine suitability of material from all sources of supply. The gradation of material from any one source, however, shall be reasonably uniform.

702.2-MORTAR SAND:

Sand (natural or manufactured) shall meet the requirements of AASHTO M 45, except delete 4.1 through 4.4 and substitute the following:

Aggregate for use in masonry mortar shall be graded within the following limits:

SIEVE SIZE	PERCENT PASSING
No. 4 (4.75 mm)	100
No. 8 (2.36 mm)	90-100
No. 100 (150 µm)	0-30
No. 200 (75 µm)	0-10

For joints thicker than ½ in. (13 mm), sand meeting the requirements of 702.1.1 through 702.1.5 and 702.6 will be permitted.

702.3-FINE AGGREGATE FOR ASPHALT MIXTURES:

Fine aggregate for asphalt mixtures shall meet the requirements of ASTM D 1073, except that the gradation requirements will be waived.

702.4-MINERAL FILLER FOR ASPHALT MIXTURES:

Mineral filler for asphalt mixtures shall meet the requirements of ASTM D 242, modified as follows: Mineral filler shall be free from harmful organic impurities. Gradation requirements will be waived.

702.5-LIGHTWEIGHT FINE AGGREGATE FOR STRUCTURAL CONCRETE:

Lightweight fine aggregate for structural concrete shall meet the requirements of ASTM C 330.

702.6-ALTERNATE GRADING:

Fine aggregate shall be well graded from coarse to fine and shall conform to the following requirements:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
⅜ in. (9.5 mm)	100
No. 4 (4.75 mm)	95-100
No. 16 (1.18 mm)	45-80
No. 50 (300 µm)	10-30
No. 100 (150 µm)	2-10

SECTION 703
COARSE AGGREGATE

Coarse aggregate shall consist of crushed stone, washed gravel (crushed or uncrushed), crushed slag, or any combination thereof, conforming to the requirements of these Specifications.

703.1-CRUSHED STONE:

703.1.1-General Requirements: Crushed stone shall consist of particles of clean, hard, tough, durable rock free from adherent coatings.

703.1.2-Deleterious Substances: Deleterious substances shall not exceed the limits set forth below:

MATERIAL	PERCENT BY WEIGHT
Thin or elongated pieces (determined by MP 703.00.25)	5
Shale (determined by MP 703.00.27)	1
Coal and other lightweight deleterious material (determined by MP 702.01.20)	1.5
Friable particles (determined by MP 703.01.20)	0.25

703.1.3-Percentage of Wear (AASHTO T 96 or ASTM C 535): Crushed stone shall have a percentage of wear not to exceed 40.

703.1.4-Soundness (Determined by MP 703.00.22): When subjected to five cycles of the sodium sulphate test, the weighted percentage of loss shall be